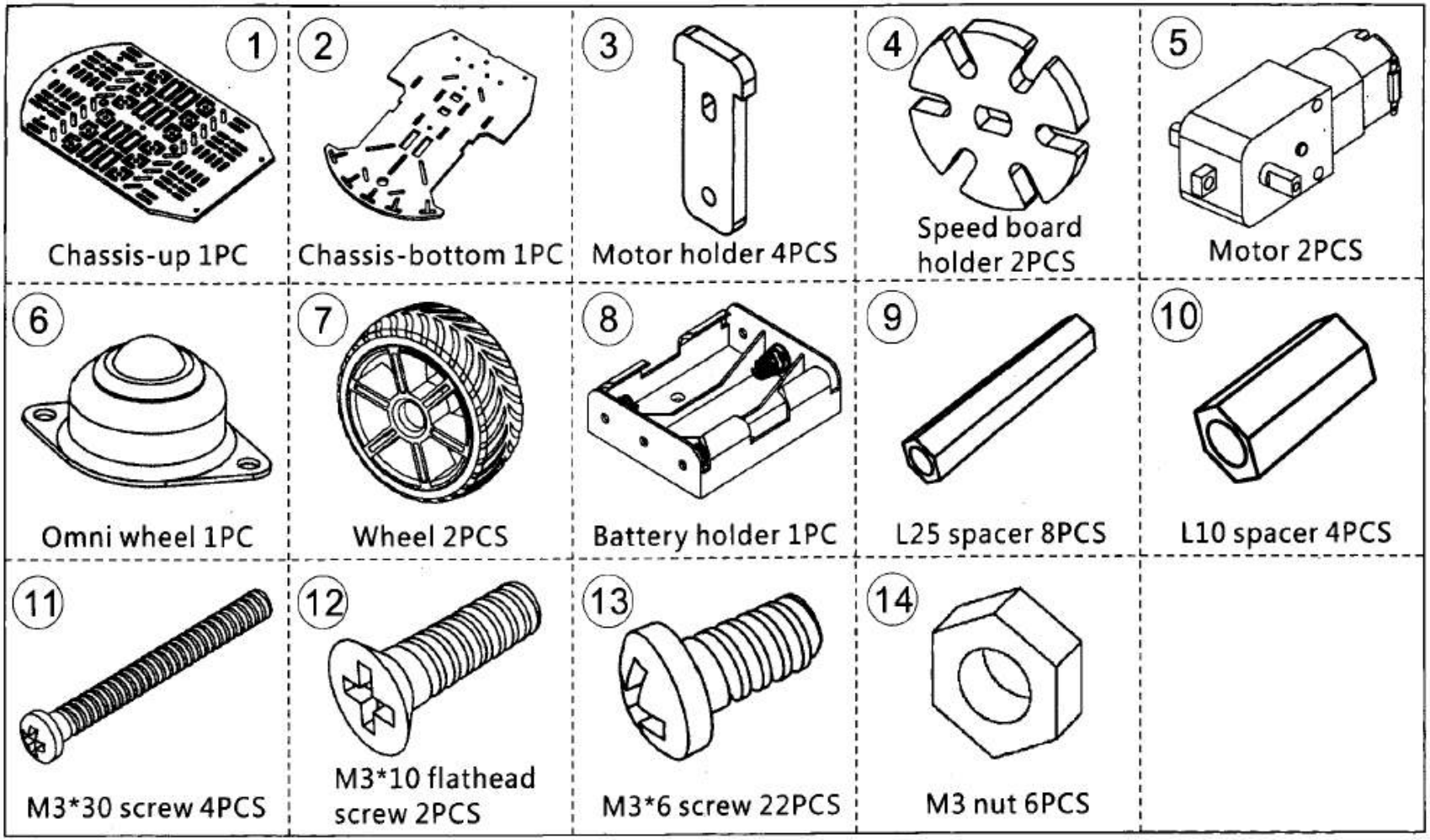
Robot Programming #13

Line Tracer

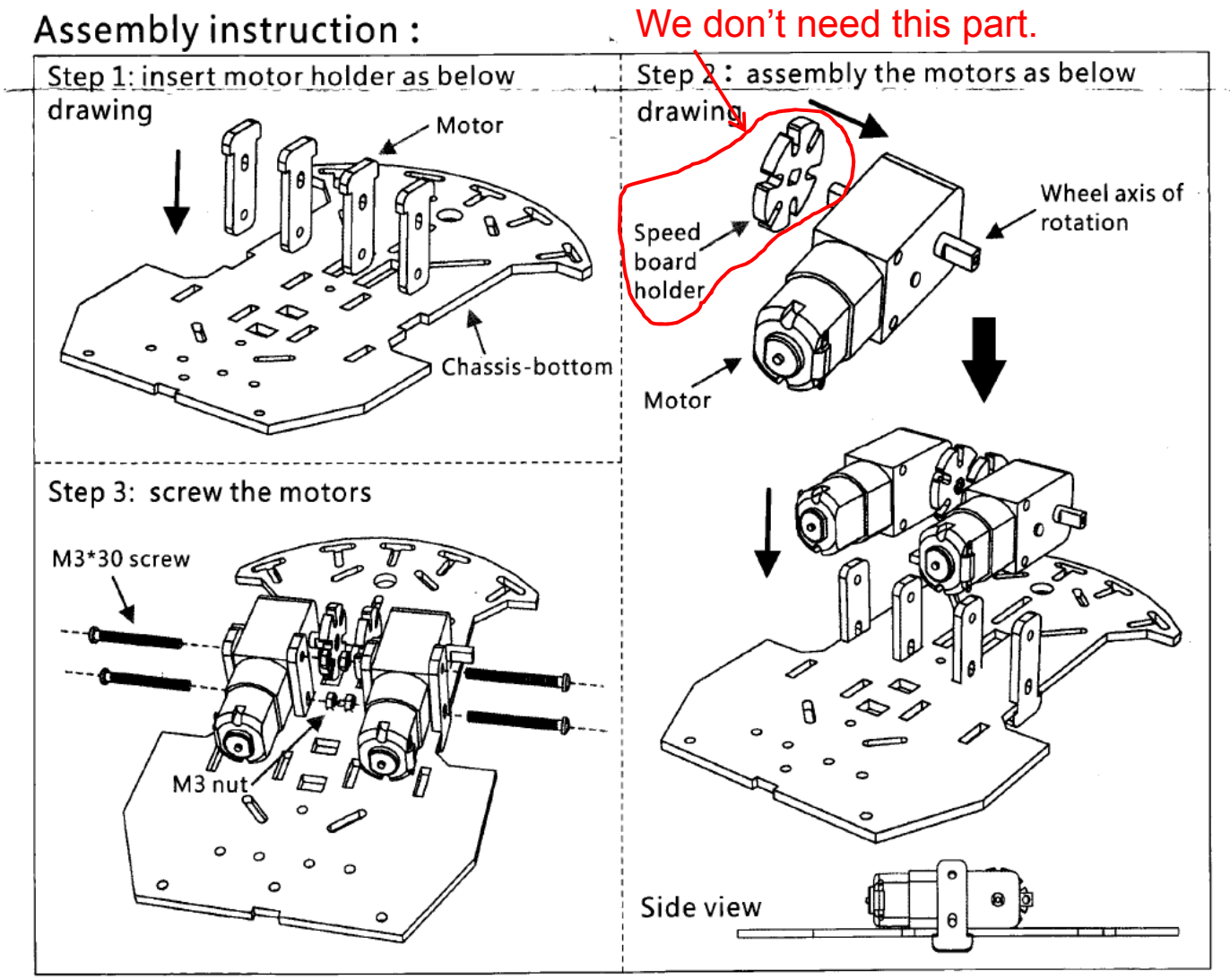
Dept. of Mech. Robotics and Energy Eng.
Dongguk University

Robot Base

Part list :

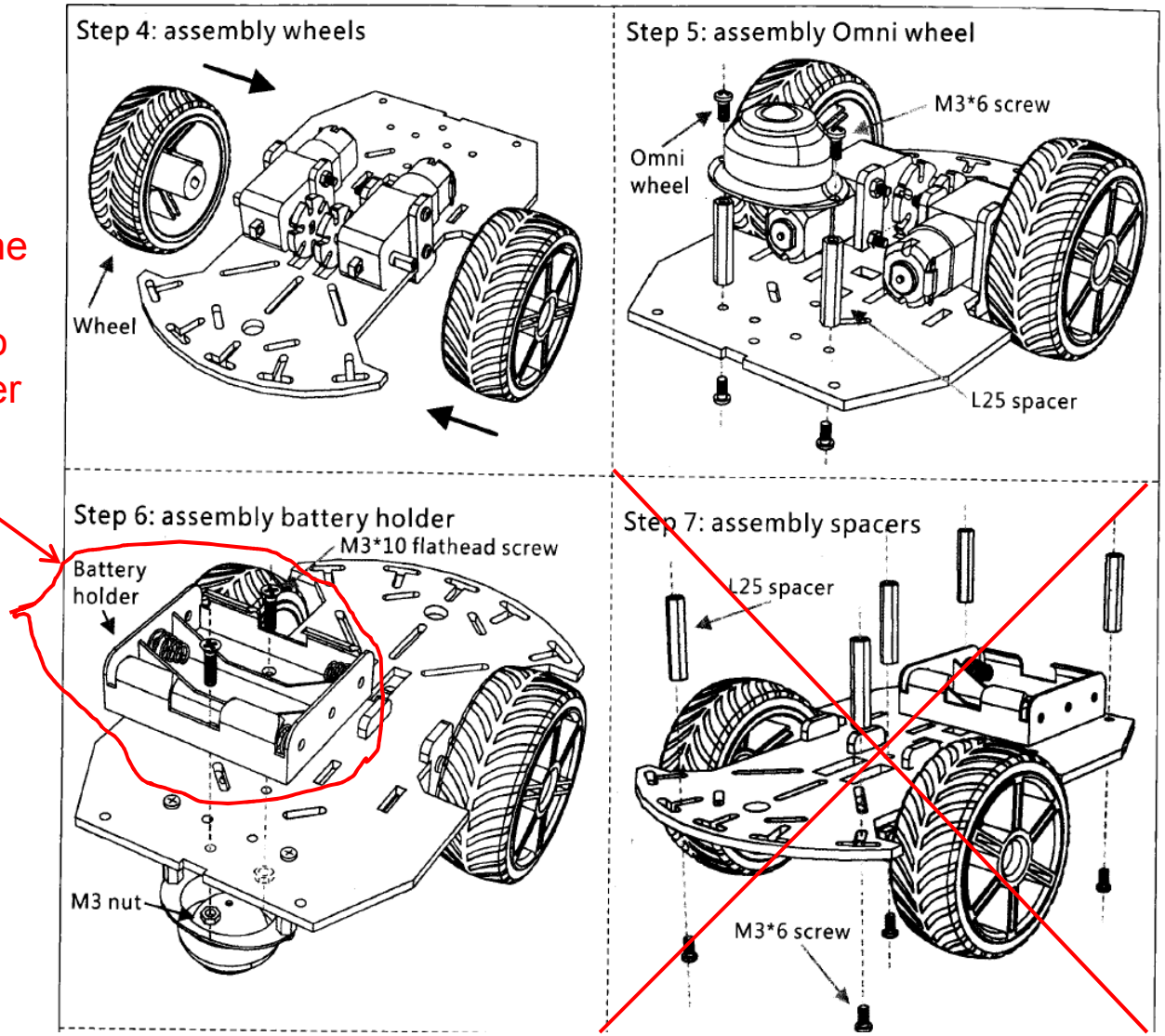


Robot Base


Assembly instruction :
We don't need this part.
Step 1: insert motor holder as below drawing
Motor
Chassis-bottom
Step 2 : assembly the motors as below drawing
Speed board holder
Wheel axis of rotation
Motor
Step 3: screw the motors
M3*30 screw
M3 nut
Side view

Robot Base

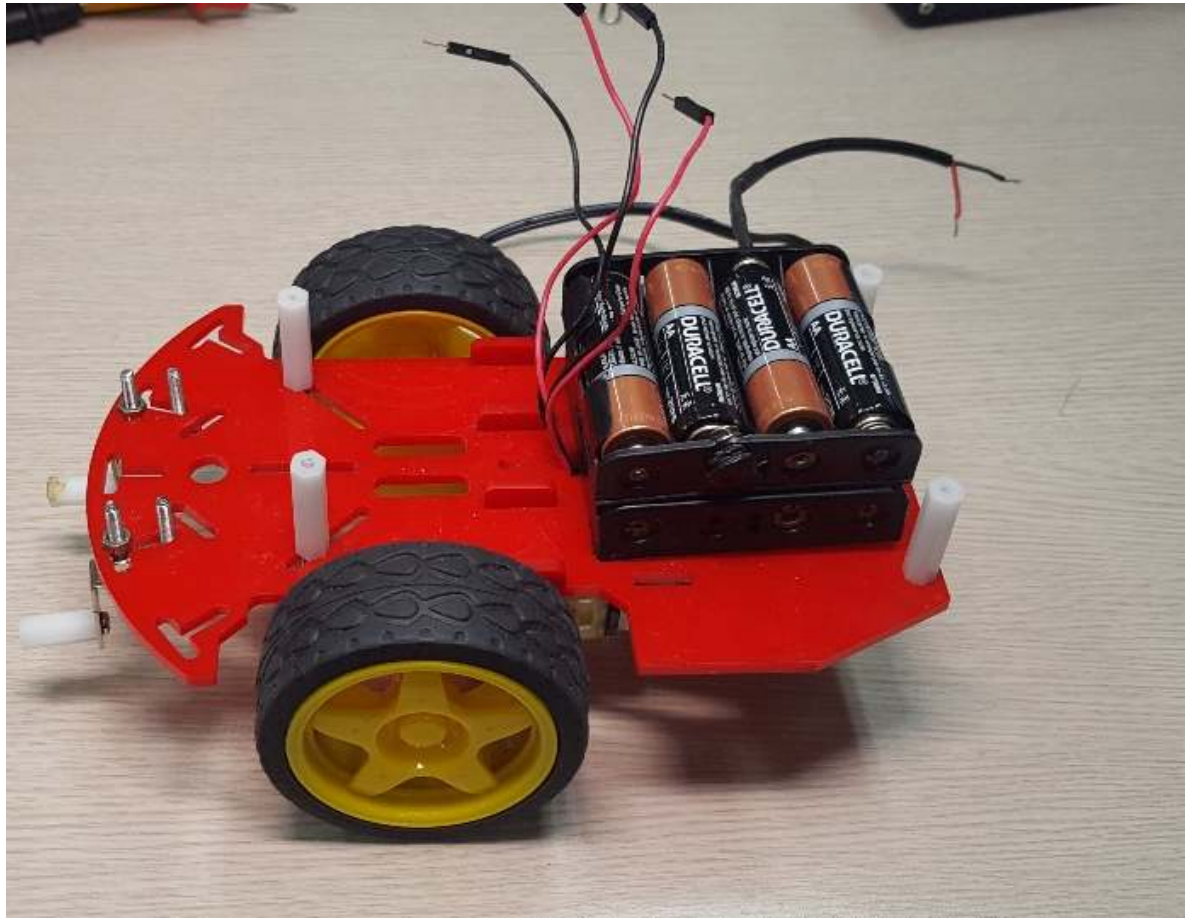
We will attach the battery holder to the upper chassis.



Line Tracer Robot

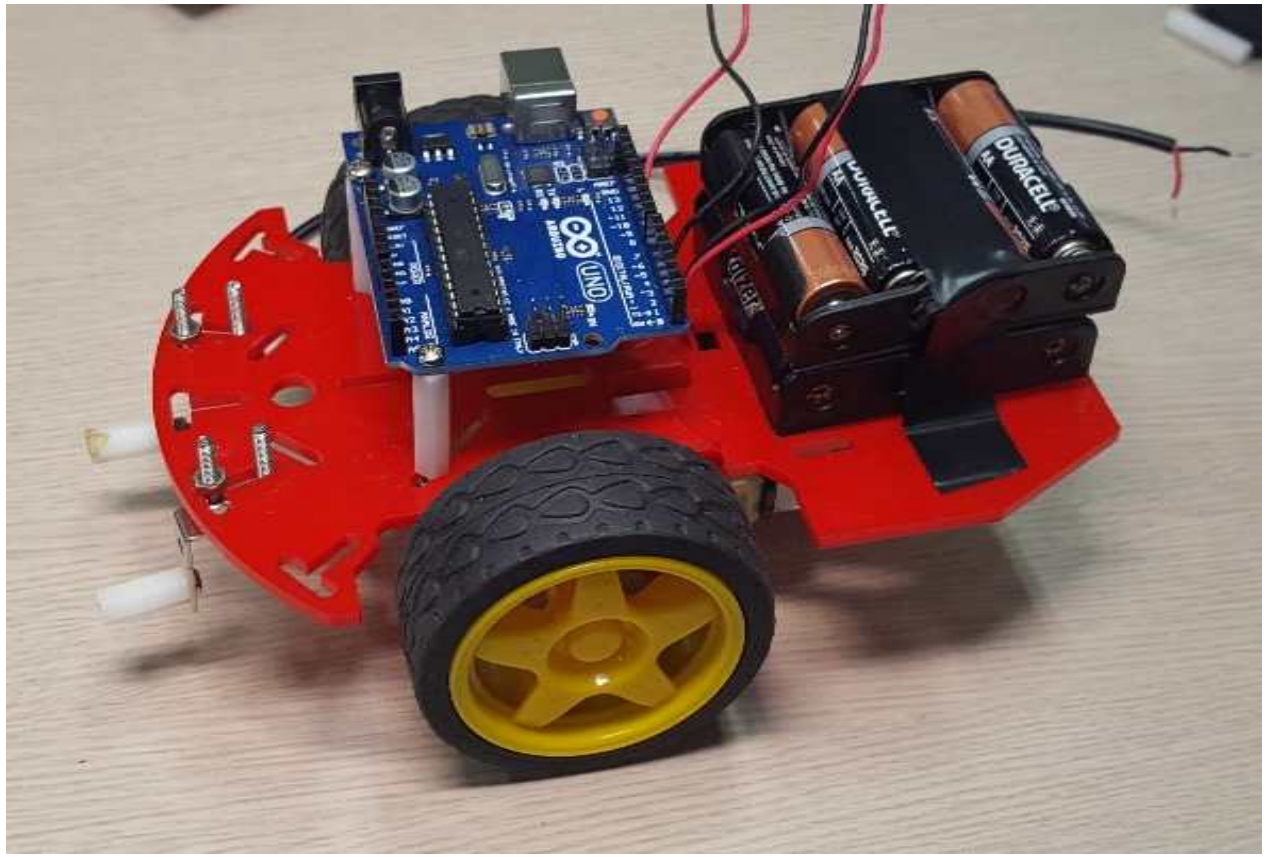
Line Tracer Robot

- Attach battery holders.



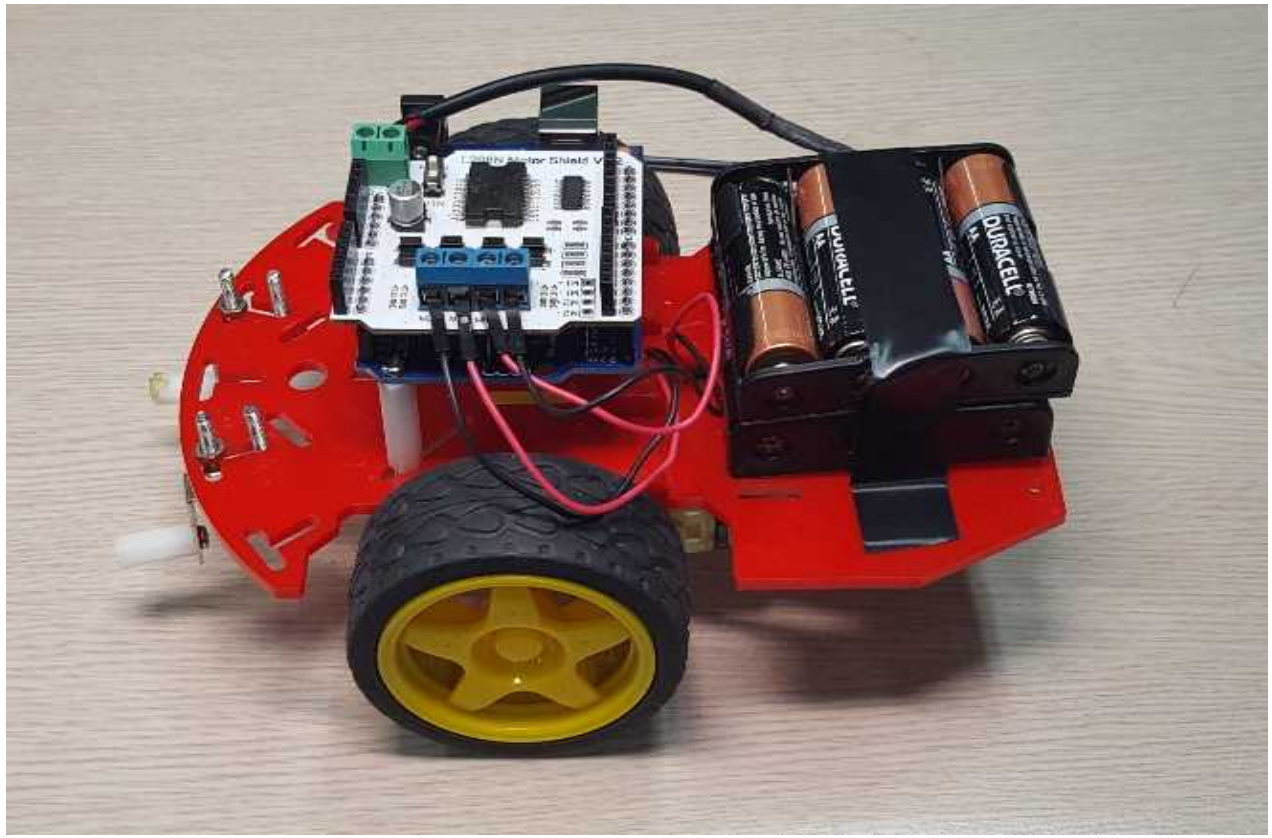
Line Tracer Robot

- Attach the Arduino as shown below.



Line Tracer Robot

- Attach the motor shield to the Arduino as shown below.



Motor Test

- Write the code to test the driver and DC motors.

```
int E1 = 4;
int M1 = 5;
int M2 = 6;
int E2 = 7;
void setup(){
  Serial.begin(9600);
  pinMode(M1, OUTPUT);
  pinMode(M2, OUTPUT);
}
void loop(){
  Serial.println("Stop");
  digitalWrite(E1,HIGH);
  digitalWrite(E2, HIGH);
  analogWrite(M1, 0);
  analogWrite(M2, 0);
  delay(500);

  Serial.println("Forward");
  digitalWrite(E1,HIGH);
  digitalWrite(E2, HIGH);
  analogWrite(M1, 255);
  analogWrite(M2, 255);
  delay(3000);

  Serial.println("Backward");
  digitalWrite(E1,LOW);
  digitalWrite(E2, LOW);
  analogWrite(M1, 255);
  analogWrite(M2, 255);
  delay(3000);
```

```
  Serial.println("Rotate");
  digitalWrite(E1,HIGH);
  digitalWrite(E2, LOW);
  analogWrite(M1, 180);
  analogWrite(M2, 180);
  delay(3000);

  Serial.println("Rotate");
  digitalWrite(E1,LOW);
  digitalWrite(E2, HIGH);
  analogWrite(M1, 180);
  analogWrite(M2, 180);
  delay(3000);

  Serial.println("Stop");
  digitalWrite(E1,HIGH);
  digitalWrite(E2, HIGH);
  analogWrite(M1, 0);
  analogWrite(M2, 0);
  delay(500);
}
```

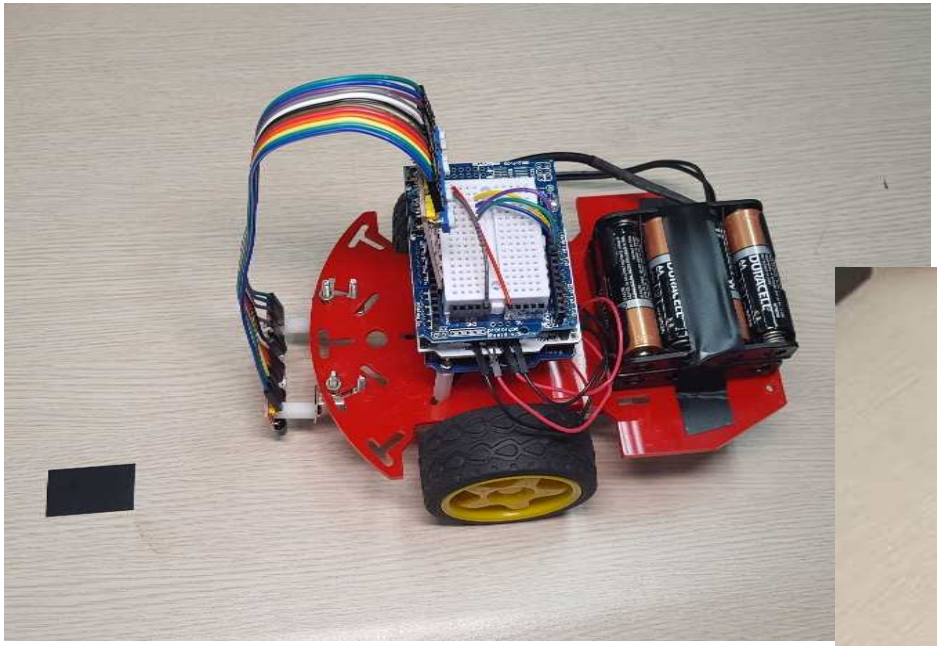
- Test video

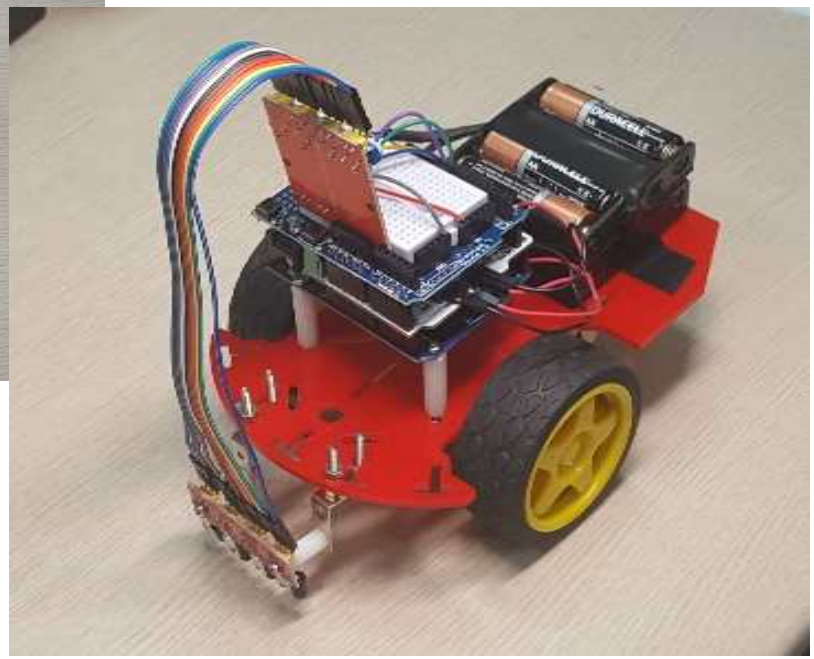
External Power Supply

- The battery may be run out quickly.
- In this case, we'd better use an external power supply to drive high-power devices.
- Use a DC adaptor if necessary.

Line Tracer Robot

- Attach the IR sensor module as shown below.





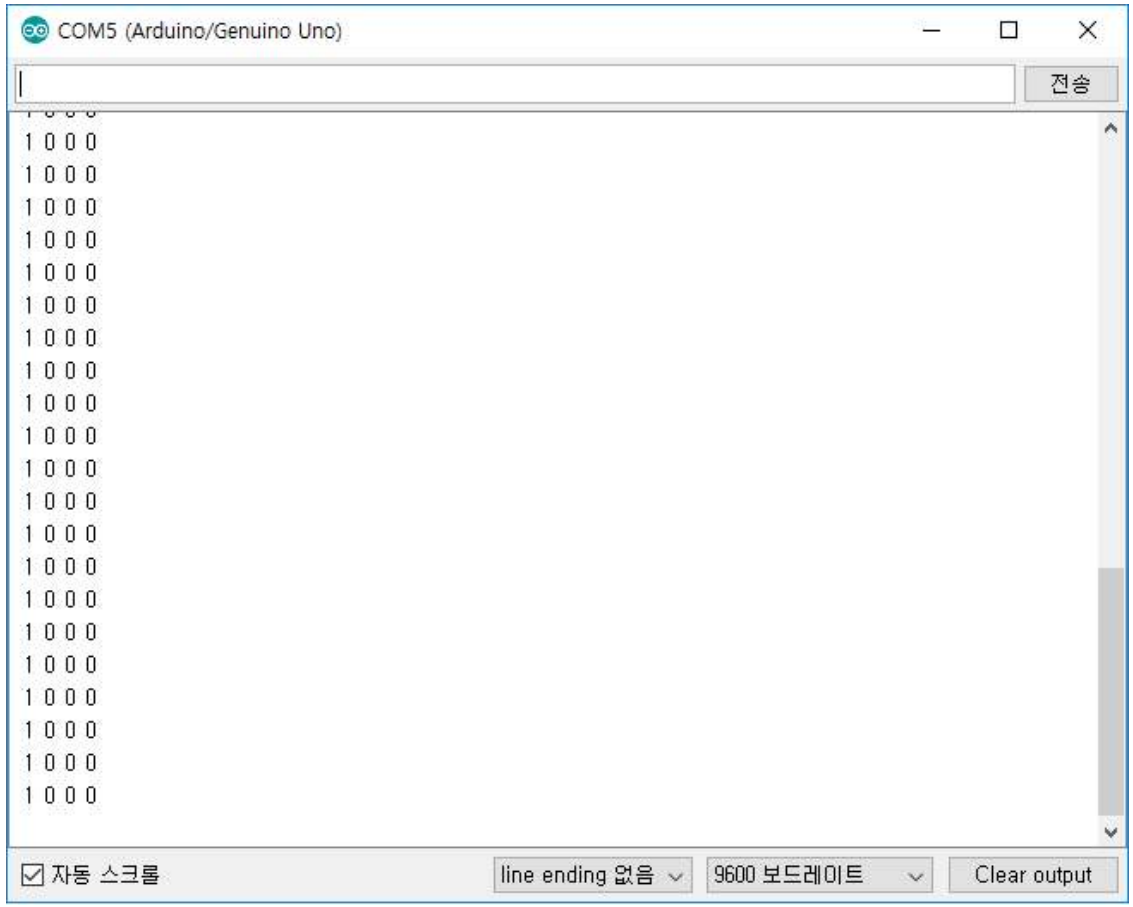
IR Module Test

- Upload the code to test the IR module.

```
int IR1 = 11;
int IR2 = 10;
int IR3 = 9;
int IR4 = 8;

int IR1_v = 0;
int IR2_v = 0;
int IR3_v = 0;
int IR4_v = 0;

void setup() {
  Serial.begin(9600);
}

void loop() {
  IR1_v = digitalRead(IR1);
  IR2_v = digitalRead(IR2);
  IR3_v = digitalRead(IR3);
  IR4_v = digitalRead(IR4);

  Serial.print(" ");
  Serial.print(IR1_v);
  Serial.print(" ");
  Serial.print(IR2_v);
  Serial.print(" ");
  Serial.print(IR3_v);
  Serial.print(" ");
  Serial.println(IR4_v);
  delay(300);
}
```

IR Module Test

- Serial monitor:



Line Tracer

- A line tracer or line follower was constructed.
- The line tracer is designed to follow a black line like a smart car.
- There are 4 sensors and 2 actuators.
- Your mission is to design a control algorithm using sensors and actuator for line following.